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ABSTRACT

Previous investigators have looked at many types of criminal offenses in order to determine alcohol involvement in crime. This longitudinal (4-year) naturalistic experimental and control designed study examined the effects of change in alcohol availability on rates of offending in a small provincial region of New Zealand following the closure of the sole hotel in each of two rural towns. Criminal offenses in the two experimental towns and the four control towns were compared across two levels: "serious" offenses (homicide; rape) or "other" offenses (property and traffic offenses). Results were consistent with previous interruption in supply-alcohol availability theory, as both antisocial (drink related) and drunk driving offenses decreased in experimental towns and increased relative to national offense trends in control towns. A causal relation between alcohol and crime was proven in this study as crime decreased significantly for 2 years in areas of reduced alcohol availability. Contains 60 references, 2 tables, and 4 figures. (JBJ)

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A Naturalistic Alcohol Availability Experiment: Effects on Crime

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A naturalistic alcohol availability experiment: Effects on crime

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Running Head: Alcohol availability and crime

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Abstract

This longitudinal (4 year) naturalistic experimental and control designed study investigated the effects of "other" crime - victims, antisocial, property and traffic offenses. In addition, "serious" crime - victims, drug, arson, and drink-driving were studied across two experimental towns and four control towns. Results were consistent with previous interruption in supply-alcohol availability theory, as both antisocial (drink related) and drink driving offenses decreased in experimental towns and increased relative to national offense trends in control towns. A causal relation between alcohol and crime was proven in this study as crime decreased significantly for two years in areas of reduced alcohol availability.

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A naturalistic alcohol availability experiment: Effects on crime

Previous investigators have looked at many types of criminal offenses in order to determine alcohol involvement in crime. Hore (1988) asked whether studies that showed fluctuations in consumption also showed corresponding fluctuations in crime rates. For example, when minimum purchase age was lowered in 3 Australian States, juvenile crime increased (Smith & Burvill, 1986ab). A second method of studying the relation between crime and alcohol investigated if the offender, or more recently the victim, had been drinking (Hore, 1988). Such studies have either concentrated on interviews of imprisoned persons, or have used recorded information such as police files, medical records, blood alcohol analysis, and prison records.

Early studies of alcohol involvement and victim offenses investigated homicides, rape, and serious assaults. Overseas studies using police records of aggravated assault cases (use of a weapon) found that at the time of the offense 24% of offenders and 25% of victims had consumed alcohol (Pittman & Hardy, 1964). One study interviewed 5622 patients receiving hospital emergency treatment (Thum, Weshler, and Demone, 1973). They found breathalysed alcohol was higher among patients treated for fighting and assault injuries than patients treated for motor vehicle accident. In another study, interviews of 10,000 prison

inmates showed alcohol was present among 53% of homicides, 61% of assaults, 39% of robberies, 47% of burglaries, 46% of car thefts, 38% of forgeries, and 67% of arson (Roizen & Schneberk, 1977).

More recently, attitudes to drink-driving as a criminal offense have been changing. Today many people would consider drink-driving a crime if a driver caused an injury, serious accident, or fatality (Wilson & Herrnstein, 1986). Even resistance to the introduction of random breath testing has decreased. Such changes in social support for random breath testing as an intervention strategy have developed over many years (Snortum, 1988). Evaluation of drink-driving as a type of offense has continued in many countries including New Zealand (Clark-Reynolds, 1987, 1989), Australia (Smith, 1986; Smith & Burvill, 1986ab), and the United States (Lund & Wolfe, 1989; O'Malley & Wagenaar, 1991; Wagenaar, 1986; Zador, Lund, Fields, & Weinberg, 1988).

We shall briefly consider studies of specific types of crimes and alcohol involvement including homicide, rape and sexual offenses, juvenile crime, and crime research in New Zealand. However, it should be noted that the frequency of these more serious offenses in the study area were fewer and, therefore, a separate dichotomy of crimes was used.

Homicide

Alcohol involvement in homicides has intrigued researchers

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for decades. There have been at least 28 different studies of alcohol involvement in homicides. Fourteen of these studies found alcohol present in at least 60% of the cases (Greenberg, 1981). Most researchers found alcohol evident in victims and offenders. One psychiatric study, in which imprisoned persons were interviewed, suggested that 70% of homicide offenders and 25% of victims had consumed alcohol before the offense (Gillies, 1965). Another study examined medical files of blood alcohol data from 372 homicide victims and 50 offenders (Hollis, 1974). In 88% of cases, offenders had been drinking, and in 80% of cases both victim and offender had been drinking. On the other hand, in another psychiatric case study of 50 murderers, only 22% of offenders had been drinking before the offense (Scott, 1968). In one study that examined police files of 588 homicides, fewer than 11% of offenders and 8% of victims had consumed alcohol (Wolfgang & Strohm, 1956).

What is evident about many studies of homicide and possible alcohol involvement is the importance of the use of reliable measures of alcohol consumption. When a reliable measure of alcohol involvement was used, for example, blood alcohol levels in offenders and victims, the studies report the highest level of alcohol involvement in homicides. When less reliable measures of alcohol involvement were used, such as self-reports, interviews, and case records, these studies showed alcohol was less likely to be involved in homicides. Greenberg (1981) noted three major

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problems with self-report sources of crime data. First, forgetting may be evident after long delays. A second source of error is that if the victim or offender was drinking at the time of the crime then they may not have encoded the event accurately. A third problem is that investigators or psychiatric assessments may only ask general questions about alcohol involvement during the offense as it is not the primary purpose of their interview (Greenberg, 1981).

Researchers have also noted that many homicides and sexual offenses occurred on weekends, suggesting a relationship with weekend drinking patterns, when alcohol consumption increases (Amir, 1967; Wolfgang & Strohm, 1956). In a New Zealand study, 76% of weekly drinking occasions occurred between Friday and Sunday (Martin, 1984). In another New Zealand study, 65% of weekly drinking occasions occurred between Friday and Sunday (Kraushaar, 1992). Recent research in Denmark (Thomsen, Albrekten, Aalund, Breiting, Danielsen, Helweg-Larsen, Jacobson, Kjerulff, & Staugaard, 1989) and the United States (Welte & Abel, 1989) has shown that a significant number of homicides occurred on weekends, at nighttime, and that high blood alcohol was recorded, especially in victims. Women appeared particularly vulnerable to sexual offenses during Saturday evenings (Amir, 1967). In the Denmark study, almost 50% of homicide victims (22/45) had high (>0.5 mgs) blood alcohol concentrations (Thomsen et al., 1989). In the U.S. study, 64% of Saturday homicides

victims and 57% of Sunday homicides victims had raised blood alcohol levels (Welte & Abel, 1989). By comparison, raised blood alcohol was found in only 5% of homicides on Tuesday afternoons. A highly significant correlation between time of day and days of the week suggested that alcohol was a causal factor in homicides, particularly if victims had also consumed alcohol (Welte & Abel, 1989).

Rape and sexual offenses

The relationship between alcohol and rape has not been as extensively studied as that between alcohol and homicide. Greenberg (1981) reviewed nine published studies investigating the association between alcohol involvement and sexual offenses; usually forced rape. In many cases both the victim and offender had been drinking. In 34% of 646 rape cases both victims and offenders had been drinking (Amir, 1967). Amir also found evidence for a relation between alcohol and the level of sexual violation in rape files. Amir (1967) suggested that there was significant relationship between alcohol and increased rape on weekends because there was more leisure time and increased alcohol consumption on weekends. In a Canadian study of rape cases between 1966 and 1975, in 72% of cases both the victim and offender had been drinking (Johnson, Gibson, and Linden, 1978). Another study found that in 35% of cases convicted rapists were alcoholics, and 50% had been drinking at the time of the offense

(Rada, 1975). In a New Zealand study of rape and sexual assault, over one third of women had been intoxicated at the time of the offense (Goodyear-Smith, 1989). However, one problem with reporting sexual offenses is that of alleged consent by the victim. Goodyear-Smith noted the disturbing statistic that alleged consent (that challenges the assumption of reasonable doubt) is more difficult to disprove if physical trauma is not part of the offense. That is, fewer offenses went to court if the woman avoided physical trauma. In cases when obvious physical trauma occurred during sexual offenses alleged consent was more difficult to maintain as a defence (Goodyear-Smith, 1989). Therefore sexual offenses may be significantly under-reported in public records.

Juvenile Crime

Smith and Burvill (1986ab) investigated the effects of "increased alcohol availability" on juvenile crime, and traffic crashes and fatalities, resulting from the lowering of minimum purchase age from 20 to 18 years of age in three Australian states. They reported significant increases in juvenile crime (under 18 years of age), and traffic crashes and fatalities. In Queensland State total female juvenile crime increased significantly, and male burglaries, theft, motor vehicle theft, fraud, and drunkenness also increased. In South Australia juvenile female crime increased, and male burglaries, theft,

motor vehicle theft, and drunkenness also increased. In Western Australia female juvenile crime, and male juvenile serious assaults, theft, motor vehicle theft, and fraud increased significantly. Lowering the drinking age had the same adverse effect on traffic crashes in these three Australian states. Based on these findings the authors stated that it is not unreasonable to conclude that raising the drinking age would lead to a reduction in juvenile crime and traffic crashes and fatalities (Smith & Burvill 1986b). North American studies have found that raising the minimum purchase age from 18 to 20, or 21, was associated with reductions in juvenile drink-driving crashes and fatalities (Du Mouchel, Williams & Zador, 1987; Hingson, Scotch, Mangione, Meyers, Glantz, Heeren, Lin, Mucatel, & Pierce; 1983; O'Malley & Wagenaar, 1991; Wagenaar, 1983; Wagenaar & Maybee, 1986; Williams, Zador, Harris, & Karpf, 1981).

The New Zealand situation

New Zealand Police have estimated that between 70% to 80% of offenders appear to have alcohol-related problems (Stewart & Casswell, 1986). The most common types of violence reported in New Zealand are abduction, robbery, firearms offenses, serious and grievous assaults (a weapon used), and common assaults (N.Z., Police Digest of Statistics, 1985 to 1989). New Zealand studies of violent offending and alcohol involvement have shown generally higher percentages of alcohol intake by offenders than studies

from Europe and North America. An early New Zealand study estimated that at least 50% of violent offenders had consumed alcohol before the offense (Schumaker, 1971). Another New Zealand study found that at least 84% of offenders interviewed reported drinking before the offense (Bradbury, 1984). New Zealand Police also report that in 90% of domestic disputes one or both parties had consumed alcohol (Report to Parliamentary Select Committee, 1979). Considering New Zealanders' per capita consumption of beer, wine, and spirits is ranked among the top ten developed countries (Australian Department of Statistics, 1988; Orchard, 1986), it should not be surprising that 70% to 80% of offenders have alcohol-related problems.

The most recent report of violent offending in New Zealand (Bradbury, 1984) studied the drinking patterns of 167 convicted violent offenders using semi-structured interviews, police files, court files, probationer reports, and interviews with prosecution and defense council. Bradbury found a relationship between the context for drinking and acts of violence. Some hotels were more conducive to violent behavior. Nearly 70% of violent offenses in the sample occurred on licensed premises, and 30% were in private dwellings. Bradbury concluded:

> Thus the heavy drinking in locales that are policed, and a lifestyle that incorporated violence, combine to produce figures that suggest a high proportion of the violent events that come

to official notice take place after the consumption of alcohol. (p. 96)

Researchers from the South Pacific Research Institute studied drinking and violence in hotels. In an early study there was a relationship between alcohol consumption and New Zealand hotel violence (Semu, 1976). A later study substantiated that there was an additional association between the "seriousness" of a violent offense and the social drinking context (Graves, Graves, Sam, & Semu, 1979). Ethnic origin was not related to violent offenses but size of drinking group and time spent drinking in hotels predicted the seriousness of offenses (Graves, Graves, Semu, & Sam, 1981).

The only New Zealand "interruption of supply study" investigated how decreased alcohol availability impacted criminal offenses following a six week strike by brewery workers (Brown, 1978). Brown found that following the reduction in beer supplies, Friday-night vehicle crashes and injuries, and antisocial categories of offending including weekly arrests for drunkenness, assault, offensive and disorderly behavior, obscene language, and fighting significantly decreased (Brown, 1978).

In summary, there is strong evidence that alcohol is linked with crime. Certainly, few studies have offered any contrary evidence against the association between alcohol and crime (Room,

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1983). Regarding the impact of alcohol availability on crime, Room states,

> "The operational test for such a conditional causation becomes, Would the crime fail to take place if alcohol were removed from the situation (p.40). From a pragmatic policy perspective, the question of cause might well be rephrased to the question, Are crime rates affected by the level or patterning of alcohol consumption?" (p. 41).

The present study describes a naturalistic experiment to examine the effects of a change in alcohol availability on rates of offending in a small provincial region of New Zealand following the closure of the sole hotel in each of two rural towns. Criminal offenses in the two experimental towns (A and B) and the four control towns (C to F) described in (Kraushaar, & Alsop, 1995a) were compared.

METHOD

Design

The closure of hotels and reduction in alcohol availability offered the unique opportunity to study offending in the experimental towns (A and B) and four "control towns" (C, D & E, and F) where alcohol availability remained unchanged. Town D was

included in Town E offenses for the purposes of counting as it had no resident police presence and was served by the police from Town E. Inclusion of these four towns served as a control for changes occurring in experimental towns and gave complete coverage of offenses in the region except for two very isolated rural police areas 50 kilometers from Towns A and B.

Quarterly offense reports formed the basis of data analysis. These included all offenses and serious offenses from Towns A to F before and after hotel closures. Closure of each hotel defined the beginning of the "after-closure" phase. If a quarter overlapped with the date of hotel closure, that quarter was excluded from analysis. Town A experienced reduced alcohol availability for 17 months and 20 days. After-closure offenses for Town A were recorded for five quarters. In 1988, offenses were recorded for Town A over four quarters as the hotel closed during the 4th quarter of 1987, and 1989 had one quarter before the new hotel opened (May 1989). Town B experienced reduced alcohol availability for two years and nine months. For Town B in 1987, there were three quarters, four quarters in 1988, and 3 quarters in 1989 as a new hotel opened the end of that year. All offenses were converted into offenses per 1,000 to allow comparability of differing population sizes across the experimental and control towns: based on 1986 population census figures. Town A offenses for the 5 quarters "before and after hotel closures" were also adjusted by multiplying each quarterly

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total by 8/5 to allow comparability of offenses per 1,000 per annum with Town B and control towns. Offenses were compared for nominal two-year periods before and after hotel closures, for the experimental and control towns.

Populations

All six towns were within the same geographic area of New Zealand. The major town (Town E) had a population of 22,944 (all population data from the 1986 census), and it had full facilities including a hospital that delivered service to a regional population of 35,000. The five smaller towns were within 40 kilometers (driving distance) of this major town (E). While the towns were sufficiently distant to be regarded as independent units, they were comparable in terms of general socioeconomic factors.

Experimental Towns

Town A (population 891) was 12 kilometers (all distances by road) south of Town E. Its sole hotel was destroyed by fire in December 1987. As a result, the nearest off-license premises were Town C (25 kilometers) and Town E. The remaining on-license premises were a rugby football club, a squash club, and a lawn bowling club. Such sports clubs are entitled to sell liquor only when sports events or training are in progress. A new hotel was opened in June 1989.

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Town B (population 1,929) was 30 kilometers west of Town E. Its sole hotel was demolished after a devastating earthquake in March 1987 (Muller, 1987). The nearest off-license premises were Town C (8 kilometers) and Town E. The remaining on-license premises were three sports clubs (rugby football, squash, and lawn bowling) and a chartered social club. Licensed chartered clubs are permitted to sell liquor for the same on-license hours as a hotel; that is, 10:00 am to 10:00 pm. A new hotel opened in December 1989.

Control Towns

Town C (population 594) was 20 kilometers west-south-west of Town E. It had one hotel with on-license and off-license facilities, and two on-license sports clubs (rugby football and golf). Town D (population 528) was 25 kilometers west-north-west of Town E. It had one hotel with on-license and off-license facilities, and one licensed sports club (rugby football). The number of outlets in these towns was unchanged from 1984 to 1989.

Other Towns

Town E, the largest in the region, had four hotels with both on-license and off-license facilities, two licensed tourist motels, three chartered clubs, and six licensed sports clubs. A new license was issued to a tourist motel in 1988/1989. Town F (population 8,595) was 40 kilometers west-south-west of Town E.

It had one hotel with on-license facilities, a wholesale off-license outlet, two licensed chartered clubs, and four licensed sports clubs. Two chartered clubs were issued licenses in 1988/1989.

Crime Data

Data were collected from police records of criminal offenses and from officers' weekly offense reports. Offenses actioned may include, for example, referral of a young offender to the youth aid officer, or prosecution. Subsequent actions were made according to offense codes and noted as a clearance of that offense in quarterly and annual offense reports. Police computer personnel at district headquarters (Town E in this study) entered and verify offense data.

All offenses are recorded under one of seven offense codes (violence, sexual offenses, drugs and antisocial behavior, dishonesty, property abuse, administration, or traffic offenses. Police National Headquarters supplied summarized and detailed quarterly offense reports for towns A to F. Every offense, or attendance by police at an incident is recorded and coded. As part of the internal audit at each policing level, the number of offenses and the later mode of action or clearance are required to balance each week. For this study, the seven offense codes were summarized into four similar offense types: victim, antisocial, property, and traffic offenses. For each offense

type, an offense was separately classified as a serious offense or "other" offense.

"Other" offenses included victim offenses, i.e., common assault (domestic assaults), and minor assaults with no weapons involved, threatening to use a weapon, and intimidation. In addition, victim offenses included indecent exposure, and sexual offenses that did not involve rape or abduction. Antisocial offenses included disorderly behavior - fighting, throwing objects, breach of the peace, gambling and bookmaking, breach of a non-molestation order, and offensive language offenses. Property offenses included burglaries, car conversion, shop-lifting, theft, forgery, fraud, and the destruction or abuse of property. Traffic offenses included speeding, vehicle road worthiness, and causing an accident, injury or death with breath/blood alcohol below that indicating drink-driving.

Serious offenses

Serious offenses were classified separately as victim, drug, arson, and drink-driving offenses. Victim offenses included aggravated robbery - involving a firearm or weapon, serious and grievous assault with intent to injure, and sexual offenses - rape, child molestation, sexual abuse, and sexual violation. Drug offenses included the supply, cultivation, possession, or importation of drugs. Arson offenses were serious property offenses that included the wilful setting fire to property or

destruction of property, and property damage that might have endangered life. Drink-driving offenses included driving or causing a crash, injury or death having excess breath/blood alcohol. Occurrence of these particular offense types and the number of offenses in quarterly reports from police stations in Towns A to F were recorded separately for the two-year periods before and after hotel closures.

RESULTS

Other offenses

Figure 1 shows "other" (victim, antisocial, property, and traffic) offenses and mean total other offenses per 1,000 in experimental and control towns before (1986/87) and after (1988/89) hotel closures. In experimental towns (A & B) actual total "other" offenses declined from 543 to 462 per 1,000, and in control towns (C, D & E, F) these offenses increased from 436 to 504 per 1,000 after hotel closures. This differential change between experimental and control towns before and after offenses was significant; $X^2(1, N = 1945) = 11.36$, $p < .0007$.

Insert Figure 1 about here

The significant reduction in experimental towns offenses after hotel closures was due to fewer incidents of antisocial,

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property, and traffic offenses. As expected, control towns offenses increased due to increased property and traffic offenses (Figure 1). Further analysis shows antisocial offenses associated with alcohol consumption decreased significantly from 38 to 16 per 1,000 in experimental towns (A and B) and increased from 30 to 38 per 1,000 in control towns (C, D & E, and F); $X^2(1, N = 122) = 8.41$, $p < .003$. Both property and traffic offenses decreased in experimental towns and increased in control towns but neither of these differences were statistically significant.

The numbers of "other" offenses in individual experimental and control towns are presented in Table 1. Overall, offenses decreased more in experimental towns and increased in control towns. For the purposes of clarifying crime data we used a criterion of 10% or greater change in number of offenses. For experimental towns "other" offenses there were four decreases more than 10% and no increases more than 10%. For control towns there were two decreases greater than 10% and five increases greater than 10%. This difference between increases and decreases above or below 10% in experimental and control towns (Table 1) was significant; $X^2(1, N = 11) = 7.54$, $p < .006$.

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Insert Table 1 about here

Total "other" offenses in experimental Town B shows a decrease in crime following hotel closure; a 30% reduction. Town A total "other" offenses decreased slightly (only 3%). In two control towns (C & F) total "other" offenses increased above the 10% criteria. In towns D & E total "other" offenses did not increase above the 10% criteria. Examination of each type of "other" offense in experimental towns shows a reduction in antisocial offenses including fighting in public, drunk and disorderly behavior, and breach of the peace. These reductions were consistent with decreased alcohol availability. In both experimental Towns A and B such antisocial offenses decreased 65% and 44% respectively. Antisocial offenses did not change systematically in control towns, as there was no change in Town C, a 50% increase in Town F, and a 30% increase in Towns D & E. In one experimental town (B) traffic offenses decreased more than the 10% criteria (25%), and remained unchanged in Town A. In control towns traffic offenses increased more than the 10% criteria (Towns C, D & E, and F, respectively 50%, 60% and 46%).

Serious Offenses

Figure 2 shows total serious offenses per 1,000 in experimental and control towns before (1986/87) and after

(1988/89) hotel closures. In experimental towns total serious offenses remained unchanged at 88 per 1,000 and in control towns total serious offenses increased from 51 to 91 per 1,000 after hotel closures. This difference was significant; $X^2(1, N = 230) = 4.45$, $p < .03$. Figure 2 shows that in experimental towns total serious offenses decreased after hotel closures due to a reduction in drink driving offenses. In control towns serious offenses increased due to increased victim, drug, and drink driving offenses. In experimental towns the changes in drink-driving were significantly different when compared with control towns; $X^2(1, N = 61) = 13.23$, $p < .0003$. Overall, serious victim offenses increased slightly from 8 to 10 in experimental towns and from 9 to 11 per 1,000 in control towns; $X^2(1, N = 38) = 0.06$, $p = .81$. Again using the criteria measure of 10% reduction in experimental towns there were five decreases greater than 10% and two increases greater than 10% (Table 2). In control towns there were no decreases greater than 10% and six increases greater than 10%: this difference was significant $X^2(1, N = 13) = 6.90$, $p < .008$. Town B again showed a decrease in total serious offenses (41%), which was consistent with the data from "other" offenses. There was a 32% increase in Town A. However, overall total serious offenses increased more in all control towns (C, D & E, F), 44%, 43%, and 44%, respectively.

Insert Table 2 about here

Examination of the types of serious offenses shows a large reduction in drink-driving offenses in Town A and B. In the control Towns, drink-driving offenses increased by 44%, 60% and 83% respectively. Drug offenses increased in experimental Town A and decreased in Town B. But in control Towns C and D & E drug offenses increased by 50%, and remained unchanged in Town F.

DISCUSSION

The present research presented a unique opportunity for a longitudinal naturalistic experimental design to study if, following the reduction in alcohol availability (and consumption) in a provincial area of New Zealand, a reduction in crime resulted. Criminal offenses were examined across two levels; that is, all offense types were separately classified as "serious" offenses or "other" offenses.

Results from the experimental towns (A & B) appear consistent with a reduction in alcohol supply according to the alcohol availability theory. Patterns of crime measured as total number of "other" and serious offenses showed significant reductions in experimental towns. In particular, the reductions of drink-driving, traffic, and antisocial disorder offenses in both experimental towns are consistent with reported reductions

in alcohol availability literature. The significant reduction in drink-driving offenses supports the growing body of alcohol availability literature that reported the effects of reduced alcohol availability in Australian (Smith & Burvill, 1986ab) and North American studies (DuMouchel, et.al., 1987; Hingson, et.al., 1983; O'Malley & Wagonaar, 1991; Wagenaar, 1983; Wagenaar & Maybee, 1986; Williams, et.al., 1981): using lowering the minimum purchase age as an indicator.

The reduction in "other" offenses including drink-driving and antisocial offenses in experimental towns is entirely consistent with the findings of other alcohol availability studies in New Zealand (Brown, 1978; Stewart & Casswell, 1986), Australian (Smith & Burvill, 1986ab) and with American studies describing the involvement between crime and alcohol (Roizen & Schneberk, 1983). These results also concur with the only other New Zealand study which examined the affects of reduced alcohol availability on offending (Brown, 1978). Brown reported similar findings including a decline in alcohol-related offenses; drink-driving, and antisocial behavior (drunkenness, disorderly behavior, and fighting) following the six week interruption in supply of beer.

In addition, the results of reduced crime reported in experimental towns converge to support the findings of a previous study which reported a reduction in consumption and changed patterns of drinking (Kraushaar & Alsop, 1995a). The level of

alcohol consumption by residents of two experimental towns, whose sole hotels were closed, was significantly lower than consumption in nearby control towns. Evidence from liquor sales and interview data converged to support this conclusion that a reduction in alcohol availability reduces consumption. This reduction/change in consumption arose not from a difference in the frequency of drinking occasions, but from a difference in the amount consumed on each drinking occasion (Kraushaar & Alsop, 1995a).

The present naturalistic experiment, also, supports the conclusions of other studies. Studies of interruption of supply (e.g., by industrial action) have found similar results in Finland (Makela, 1980), Norway (Horverak, 1983), Canada (Smart, 1977), and New Zealand (Brown, 1978). However, the interruptions of supply in these earlier studies were relatively short (weeks) in duration and widespread in nature, and this offered few opportunities for consumers to arrange other sources of alcohol. The present study, spanning almost two years, showed (using sales data) that a significant reduction in alcohol availability was influential in reducing consumption over two years duration. Indeed, corresponding alcohol availability research using correlational and regression analysis has produced more mixed results (Ashley & Rankin, 1988; Farrell, 1985; MacDonald & Whitehead, 1983; Smith, 1983; Single, 1988), however, there are notable differences between the present study and previous

research. For example, many previous studies examined the effect of "increases" in alcohol availability in situations where alcohol was already reasonably available. In contrast, the present study examined a decrease in alcohol availability, and that decrease involved the loss of the traditional source of alcohol in that community.

The fortuitous set of circumstances enables this naturalistic experimental to depart from correlational and regression studies with their "plethora of indicators" (Ravn, 1987). Furthermore, the present study allowed ready comparison between the experimental towns and suitable control communities because the reduction in availability was so localized. Second, previous studies of the number of outlets and its relation to levels of increased alcohol consumption have been somewhat ambiguous (Ashley & Rankin, 1988; Farrell, 1985; Single, 1988; Smith, 1983). In this and a previous study, total liquor sales, drink driving, and interview data all converge to show a decrease in alcohol availability impacted both experimental town residents, but not control town residents. Furthermore, a change in the context for drinking appears to have been a major factor contributing to the reduction in the amount consumed on each drinking occasion.

However, this study has three main areas of concern which need to be addressed. First is the relocation of drink-drivers and crime from experimental towns to control towns. Second, is

the large increase in serious offenses in control towns. A third issue concerns the status of experimental and control towns as independent units.

Firstly, regarding the relocation of drinkers, antisocial offenses such as fighting in public, drunken and disorderly behavior, and breaches of the peace decreased in both experimental towns (A and B). While antisocial offenses remained unchanged in Town C (Table 1), increased 30% in Towns D & E and 50% in Town F. Traffic offenses including speeding and reckless driving also declined in experimental towns but increased substantially in two control towns. More significantly, however, drink driving declined in both experimental towns. However, drink-driving offenses more than doubled (from 13 to 32 per 1,000) in control town police areas during the same period.

Table 2 showed that the largest increase in drink-driving offenses occurred in Town F. Relocated drinking or drink-driving by experimental town residents did not appear responsible for increase drink-driving offenses in Town F. Town F drink-driving increased (10 per 1,000) more than the combined increase in Towns C, D & E (9 per 1,000). Yet Town F is the most distant town from experimental towns in this study: 40 kilometers from Town A and 35 kilometers from Town B. A possible explanation for increased drink-driving and antisocial offenses in Town F was that two new chartered clubs (high risk venues of alcohol consumption - liquor sales 10:00 am - 10:00 pm) opened in 1988/89. Town F liquor

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sales had, also, increased 65% (Kraushaar & Alsop, 1995a). This large increase in liquor sales could reasonably translate into increased drink-driving from high risk venues for alcohol consumption: chartered clubs.

Additional evidence of the lack of relocation of offenders from experimental to control towns is supported by national crime data. A Report in the 1988 Police Digest of Statistics showed "National" offense rates per 1,000 (including serious offenses) from 1985 to 1988 were respectively 123.9, 131.6, 132.1, and 130.2 (New Zealand Police, 1989, p. 69). Control town offenses (including serious offenses) per 1,000 between 1985 and 1988 were respectively 120.80, 123.43, 137.46, and 139.20. The control town crime levels were therefore consistent with the national levels and support evidence that the corresponding decrease in crime did not appear in any other control towns' crime data.

It was of interest to compare domestic assaults between experimental and control towns, in view of national police reports that in 90% of domestic disputes one or both parties had consumed alcohol. Although serious assaults (victim - Table 2) increased in Town A, assaults in a domestic setting did not change in both experimental towns. A possible explanation comes from the previous study (Kraushaar & Alsop, 1995a) that in both experimental and control towns, drinking at home mediated low levels of consumption. Domestic violence may therefore be due to men coming home drunk from licensed venues of high alcohol

consumption.

The second issue concerns the increase in serious offenses, principally in experimental Town A. Total serious offenses increased 22% due to drug and victim offenses rising. Whereas in Town B drug and victim offenses decreased (Table 2). Why this differential change occurred in one experimental town and only one control town (C) appears conjectural. The full analysis of before, during, and after hotel closure crime data may reflect more on this apparent observation.

The third issue concerns the status of the experimental and control towns as independent units; that is, there might have been a major relocation of drinkers from experimental towns to control towns. As noted above the interviews (Drinking occasions above legal limits, drunkenness, and spending on alcohol), and the drink driving data indicated that this did not happen (Kraushaar & Alsop, 1995a). Furthermore, if substantial relocation had occurred, then liquor sales in nearby towns should show a disproportionate increase. Again, this did not appear to be the case. To further check this hypothesis, we compared the liquor sales between control towns (C & D) and two other towns (E & F) over a 40 kilometer radius for this region (population about 30,000). Over the period 1988 to 1989, when the hotels in Towns A and B were closed, the rates of increase in liquor sales in towns C, D, and E were very similar in these distant towns. Town F showed the only marked increase in liquor sales over this

period, but it seemed most unlikely that the difference was due to relocation of drinkers from town B (the closest experimental town). This would have entailed travelling (40 kilometers to Town F) through Town C which had its own hotel and wholesale off-license facility. Instead, the increase in sales in Town F seemed related to the opening of two new chartered clubs; that is, there was an increase in alcohol availability for residents of that town. Therefore, it seems reasonable to compare each town as an independent unit before and after hotel closures.

The present long-term study supports such views and also adds to the body of literature on interruption of liquor supply studies. Plus the results indicate that alcohol availability and context for drinking may be important codependent factors when considering alcohol-related problems. Indeed, this study shows the resulting decrease in alcohol availability mediated by the context for drinking has relevance both at the individual level for drink drivers, and relevance for rural communities regarding overall crime rates.

As hypothesized by the theory of alcohol availability both total serious offenses and total "other" offenses declined in experimental towns following a reduction in alcohol availability. Whereas both categories of crime increased in control towns. These results are entirely consistent with expectations concerning decreased alcohol availability and the types of offenses showing marked reductions. Regarding the impact of

alcohol availability on crime, Room (1983) asked whether crime would change if patterns and levels of consumption changed? A previous study (Kraushaar, & Alsop, 1995a) showed that in experimental towns patterns and levels of consumption changed following a reduction in alcohol availability but this was mediated by the context for drinking. The present study showed clear evidence of a differential change in the two experimental towns total serious offenses and total "other" offenses following the reduction in alcohol availability, compared to continued increase in serious and "other" offenses total in control towns during the same period. We may therefore conclude that the reduction in alcohol availability was associated with the decrease in rates of both "serious" and "other" offenses. Thus Room's operational test of conditional causation seemed proven because "crime rates" (in this case) were affected by both the pattern of consumption (Kraushaar & Alsop, 1995a) and by alcohol being removed by the naturalistic situation in two rural towns.

This study also answers the call for researching more naturalistic experiments (Room, 1984), with control group comparison (Mulford & Fitzgerald, 1988), using smaller areas as appropriate units of analysis (Holder, 1988), so as to force analysis of changes in alcohol availability away from regression or correlational designs (Douglas, et.al., 1980). In addition, this study extends the benefits that can be gained from longitudinal naturalistic experimental and control group designs

to evaluate the effects of alcohol availability. Thus we contend that similar studies may help formulate better primary prevention strategies (Moskowitz, 1989; Room, 1984) such as suggested by the behavioral theory of choice supporting inexpensive, accessible alternatives to drinking in hotels and clubs (Kraushaar, 1992) in rural communities.

In conclusion, this study supports the drink-driving research of an association between alcohol availability and crime (Room, 1983). In two experimental towns both serious and "other" offenses separately showed a differential change following hotel closures. In particular, changes in drink-driving and alcohol-related antisocial offenses decreased. In control towns offenses continued to increase consistent with national levels.

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Table 1
Percentage change per 1,000 in experimental (A and B) and control (C, D & E, F) town "other offenses" before 86/87 and after 88/89 hotel closures.

	A			B			C			D & E			F		
	86/87	88/89	change	86/87	88/89	change	86/87	88/89	change	86/87	88/89	change	86/87	88/89	change
Victim	16	16		5	5		8	6	25%	5	5		7	7	
Antisocial	29	10	65%	9	6	-44%	18	18		7	10	+30%	5	10	+50%
Property	171	178		180	128	28%	180	184		82	77		81	99	+18%
Traffic	79	79		54	40	25%	30	60	+50%	6	15	+60%	7	13	+46%
Total	295	283		248	179	-28%	236	268	+12%	100	107		100	129	+22%

*Criteria change greater than 10%

Table 2
Percentage change per 1,000 in serious offenses in experimental (A & B) and control (C, D & E, F) before 86/87 and after 88/89 hotel closures.

Towns	A			B			C			D & E			F		
	86/87	88/89	change*	86/87	88/89	change	86/87	88/89	change	86/87	88/89	change	86/87	88/89	change
Victim	5	8	+38%	3	2	-33%	5	7	+36%	2	2		2	2	
Drugs	14	21	+33%	10	8	-20%	16	32	+50%	3	6	+50%	8	8	
Arson	2	1	-50%	1	1		0	0		1	1		1	1	
Drunk drive	3	1	-66%	10	2	-80%	9	15	+40%	2	5	+60%	2	12	+83%
Totals	24	31	+22%	24	13	-41%	30	54	+44%	8	14	+42%	13	23	43%

*Criteria change greater than 10%.

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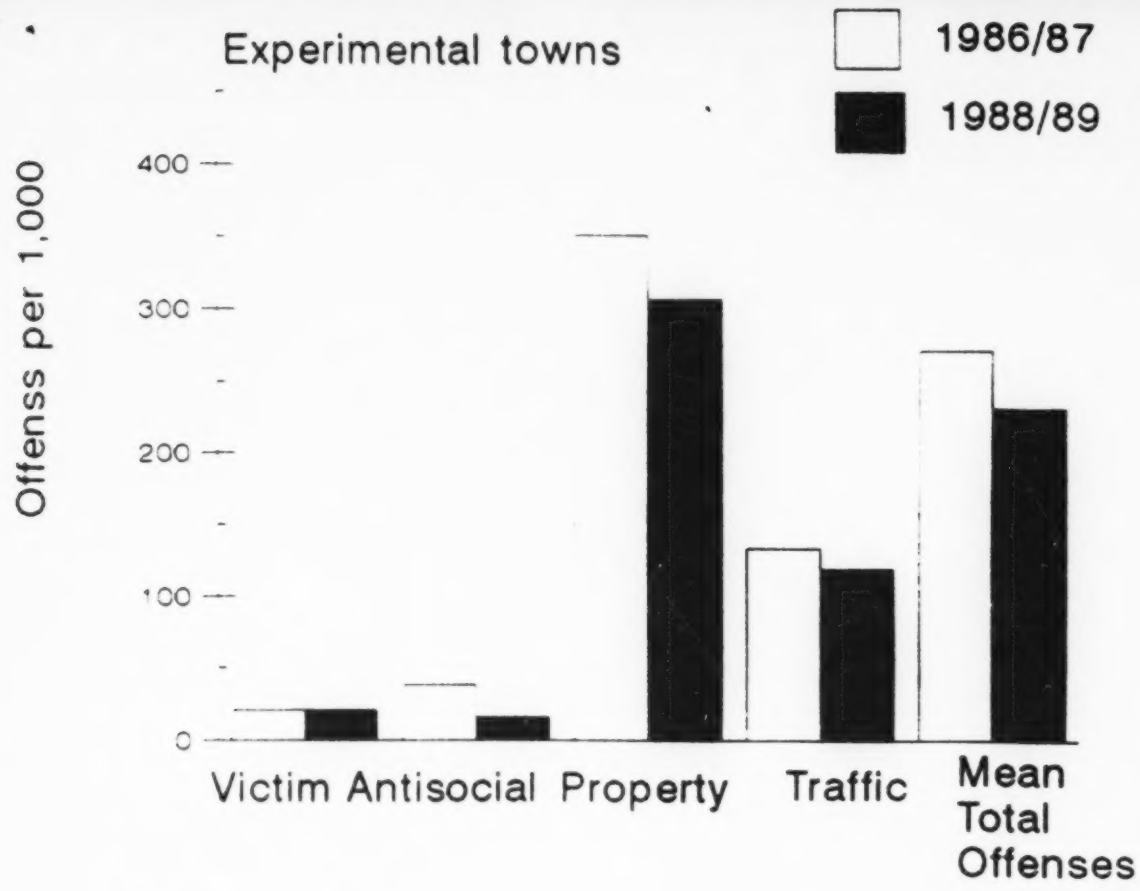
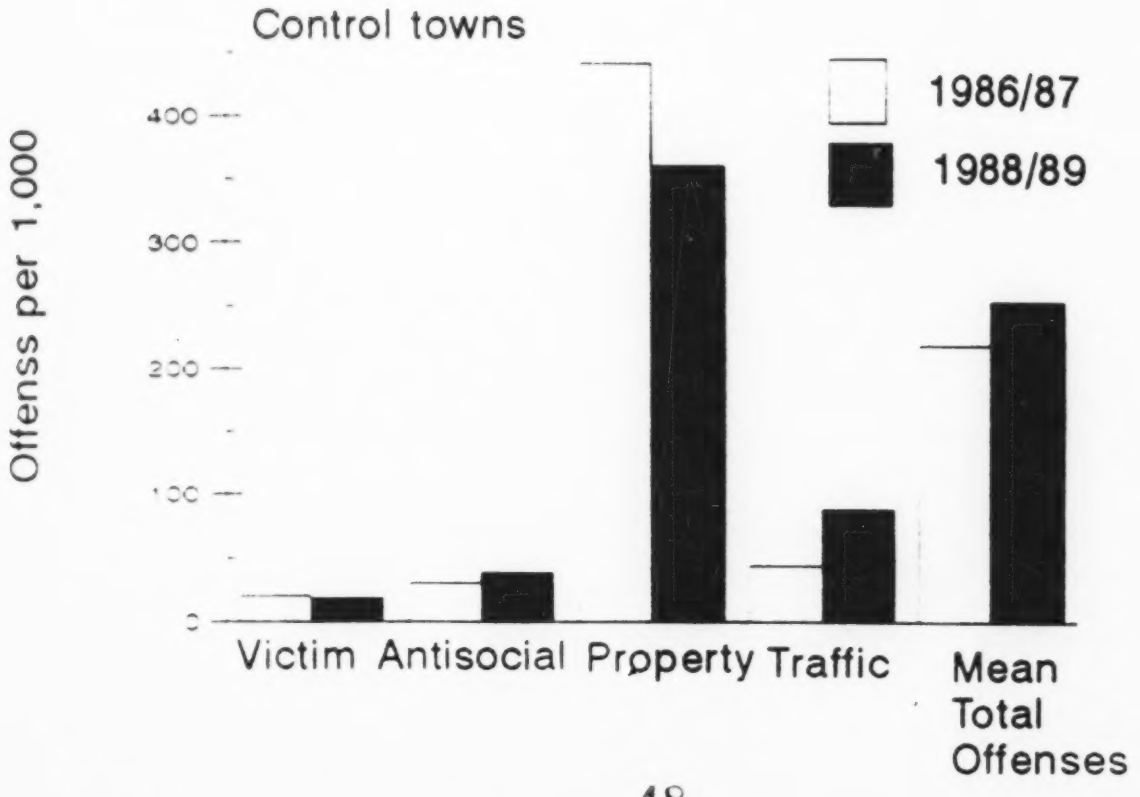
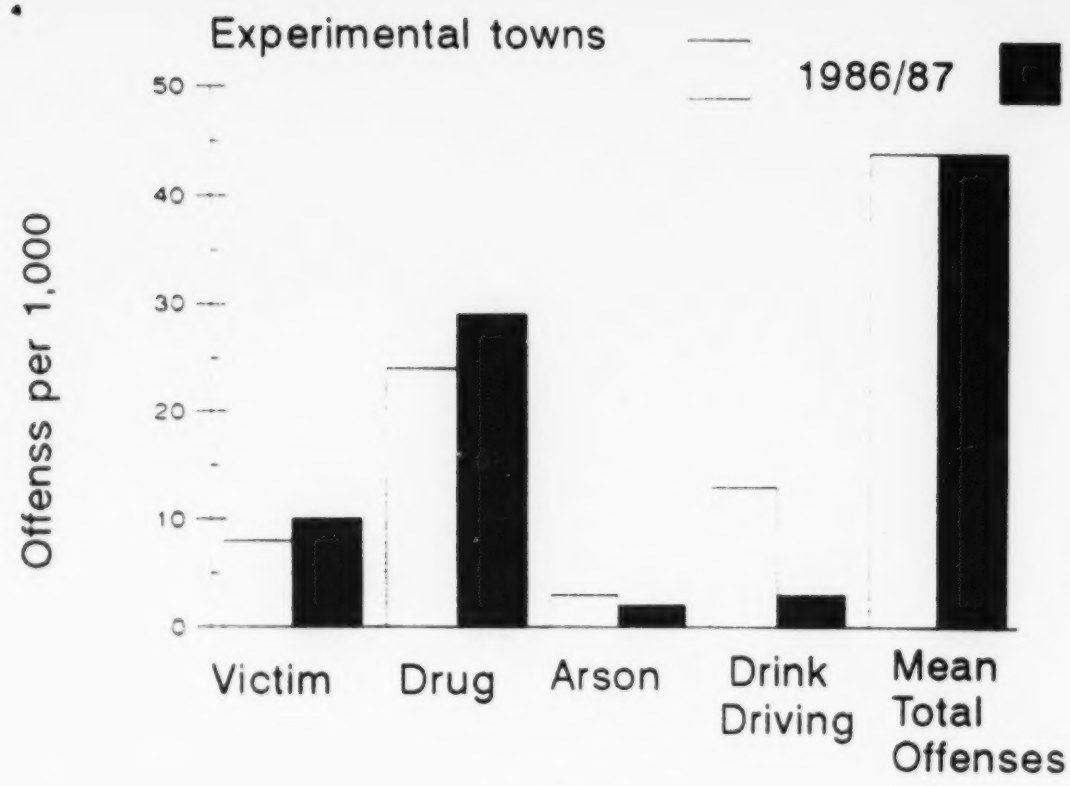
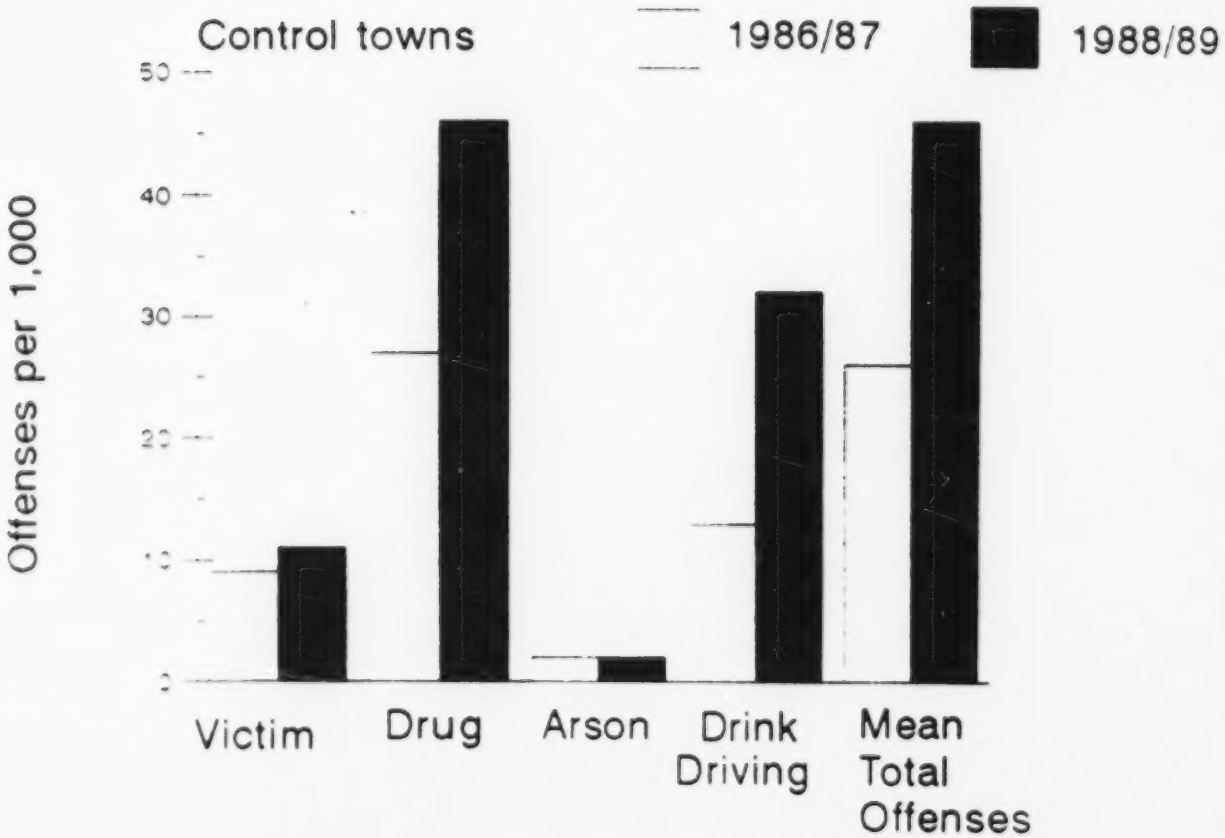
Figure Table

1. "Other" offenses per 1,000 across experimental and control towns.
2. "Serious" offenses per 1,000 across experimental and control towns.


Experimental towns
1986/87
1988/89
Offenss per 1,000
400
300
200
100
0
Victim
Antisocial
Property
Traffic
Mean Total Offenses


Control towns
1986/87
1988/89
Offenss per 1,000
400
300
200
100
0
Victim
Antisocial
Property
Traffic
Mean Total Offenses


Experimental towns
1986/87
1988/89
Offenss per 1,000
50
40
30
20
10
0
Victim
Drug
Arson
Drink Driving
Mean Total Offenses


Control towns
1986/87
1988/89
Offenses per 1,000
50
40
30
20
10
0
Victim
Drug
Arson
Drink Driving
Mean Total Offenses